



# **Air Quality Permitting Technical Analysis**

December 10, 2002

**Tier II Operating Permit and Permit to Construct  
No. 055-00047**

**Foam Molders, Post Falls**

Project No. T2-020105

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**FINAL PERMIT**

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## ACRONYMS, UNITS, AND CHEMICAL NOMENCLATURE

acf	actual cubic feet
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AP-42	United States Environmental Protection Agency Compilation of Air Pollutant Emission Factors
Btu	British thermal unit
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EPA	Environmental Protection Agency
EPS	expandable polystyrene
gr/dscf	grains per dry standard cubic feet
HAP	hazardous air pollutant(s)
IDAPA	A numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
km	kilometer
lb/day	pound(s) per day
lb/hr	pound(s) per hour
MACT	Maximum Available Control Technology
MMBtu	million British thermal units
MMBtu/hr	million British thermal units per hour
MMscf	million standard cubic feet
NESHAP	National Emission Standards for Hazardous Air Pollutants
NG	natural gas
NO <sub>2</sub>	nitrogen dioxide
NO <sub>x</sub>	nitrogen oxides
NSPS	New Source Performance Standards
O <sub>3</sub>	ozone
Pb	lead
PM	particulate matter
PM <sub>10</sub>	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PSD	Prevention of Significant Deterioration
PTC	permit to construct
scf	standard cubic feet
SIP	State Implementation Plan
SO <sub>2</sub>	sulfur dioxide
SO <sub>x</sub>	sulfur oxides
T/yr	tons per year
VOC	volatile organic compound(s)

## **PURPOSE**

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01 Sections 400 through 470, *Rules for the Control of Air Pollution in Idaho* for Tier II Operating Permits and Sections 200 through 228 for Permits to Construct.

## **PROJECT DESCRIPTION**

This project is to update <sup>AND</sup> modify the previously issued Tier II operating permit. The modification changes to the permit are new source review related, therefore, the new permit is now a Tier II/PTC.

## **SUMMARY OF EVENTS**

DEQ received an application for a Tier II operating permit from Foam Molders, Inc.

March 12, 2002: Application received.  
May 17, 2002: Determined complete.  
May 22, 2002: August 1990 VOC emissions report received by DEQ.  
8/22 – 9/20, 2002: Public comment period held. No comments received.

## **Permitting History**

September 26, 2000: Tier II operating permit issued.

## **DISCUSSION**

### ***General Facility Process Description***

The EPS raw material, or beads, come into the facility in 1,000-lb lined boxes. The beads contain an encapsulated blowing agent, pentane, usually 3.5 to 6.5% in the material by weight. The emissions rates at each phase of the operation vary according to such factors as the density of the expanded beads, the shape and size of the molded part, and finished goods storage requirements. The beads are typically vacuum fed from the boxes to the pre-expander where the beads are partially expanded to their desired density (referred to as pre-puff).

About 25% of the pentane is released in the expansion process. The material is then aged 2- to 48-hours to allow the pre-puff to stabilize by diffusing air into the expanding beads. About 20% of the initial pentane is released during this aging process. The material is then transferred directly to molds where, with the use of steam, they are fused together into shapes created by the forms. About 15-25% of the initial pentane is released during the molding process. In the post-molding phase, about 15% of the initial pentane is released in the first 24 hours, and 10% in the next 24 hours. The remaining 15% pentane diffuses out of the product over a long period.

The emissions points as described are identified by the Radian report on Table 5-1 and Figure 5-2. The Radian report can be found within the appendix of this memorandum.

The emissions sources of the facility include the:

- Boiler (Superior, Model 6-x-750, 6.3 MMBtu, 150 horsepower natural gas).
- EPS bead processing equipment - pre-expander, storage bags, block mold, and storage area.

### **Facility Classification**

The facility is not a designated facility as defined in IDAPA 58.01.01.006. The AFS classification is synthetic minor (potential uncontrolled emissions are greater than 100 T/yr but permitted potential emissions are less than 100 T/yr). The facility is not subject to PSD permitting requirements for a major modification because the facility's potential to emit is less than 250 T/yr. This facility is an expanded plastic foam product manufacturing facility, Standard Industrial Classification code 3086.

### **Area Classification**

Foam Molders, Inc. in Kootenai County, Idaho, is located in Air Quality Control Region 062. The area is classified as unclassifiable for all federal and state criteria air pollutants (i.e., PM<sub>10</sub>, SO<sub>x</sub>, O<sub>3</sub>, NO<sub>2</sub>, CO, and Pb). There are no Class I areas within 10 km of the facility.

## **TECHNICAL ANALYSIS**

### **Emissions Estimates**

The boiler emissions were estimated using the latest emissions factors from AP-42 and the rated capacity of 6.3 MMBtu/hr.

Example calculation:

$$(6.3 \text{ MMBtu / hour}) \times (1 \text{ scf NG / 1,050 Btu}) \times (7.6 \text{ lb PM}_{10} / 1 \text{ MMscf NG}) = 0.0456 \text{ lb/hr PM}_{10}$$

The grain-loading limit specified in Permit Condition 2.15 will not necessitate monitoring the boiler emissions when natural gas is used because at the maximum rate of operation, the calculated PM concentration does not exceed the limit, as follows:

$$(0.05 \text{ lb PM / 1 hour}) \times (1 / 1500 \text{ acfm}) \times (1 \text{ hour / 60 min}) \times (7,000 \text{ gr / 1 lb}) = 0.004 \text{ gr/acf}$$

The actual exit flow rate from this boiler is unknown. The exit flow rate value used in this calculation is a typical flow rate for this size of boiler.

The resulting grain-loading value is compared to the regulatory limit of 0.015 gr/dscf. The conversion from actual to dry standard cubic feet is unlikely to result in a difference that would result in the standard being exceeded.

Emissions estimates from the EPS expansion, molding, and storage operations were estimated based on the report: "EPA-450/3-90-020 Control of VOC Emissions From Polystyrene Foam Manufacturing," August 1990 developed by Radian Corporation for the U.S. EPA (United States Environmental Protection Agency). It established that, on the average, 85% of the original pentane (pentane is the only VOC) within the EPS beads by weight would be released during the processes used to develop the expanded plastic foam products. The hourly emissions estimate was based on the equipment's maximum hourly throughput and a 7% pentane concentration (the facility's estimate). The permit limits the pentane concentration to 7% and requires tracking of pentane concentration in the material purchased to show compliance with the 7% limit. The annual limit was written to ensure that the major source threshold level is not exceeded.

### CONTROLLED POTENTIAL EMISSIONS

Potential Emissions <sup>a</sup> - Hourly (lb/hr) and Annual <sup>b</sup> (T/yr)										
Source Description	PM <sub>10</sub>		NO <sub>x</sub>		CO		VOC		SO <sub>2</sub>	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Boiler	0.05	0.20	0.60	2.63	0.50	2.21	0.03	0.14	0.004	0.02
EPS expansion, molding, and storage							119	95.2		

<sup>a</sup> As determined by a pollutant-specific U.S. EPA reference method, a DEQ-approved alternative, or as determined by the DEQ's emissions estimation methods used in this permit analysis.

<sup>b</sup> As determined by multiplying the actual or allowable (if actual is not available) pound per hour emissions rate by the allowable hours per year that the process(es) may operate(s), or by actual annual production rates.

### Modeling

No modeling was required for this permit because the emissions from the boiler are negligible and pentane is not a criteria pollutant.

### Toxic Pollutants

Pentane is a toxic air pollutant. The increase in pentane emissions from this permit modification, 62 lb/hr, is less than the screening emissions level of 118 lb/hr.

### Regulatory Review

#### 1. Scope

Foam Molders has requested a modification of their permit to cover the new equipment installed in the winter of 2001/2002. This modification allows an increase in the production rate from 900 lb/hr to 2000 lb/hr of polystyrene and an increase in the pentane emissions from 57 lb/hr to 119 lb/hr.

#### 2. Facility-wide Conditions

The test methods section was deleted from the facility-wide conditions because no testing is required in this permit.

The sulfur content of fuels requirement was deleted from the facility-wide conditions because no sulfur-containing fuel has been identified as being used at the facility.

The previous permit had requirements specifically for the natural gas boiler. These requirements are already specified in the facility-wide provisions. Therefore, the modified permit removed the specific requirements for the boiler. The previous permit's operating requirement to combust natural gas exclusively is not needed in the revised permit because the permit application states that the boiler is fired on natural gas.

#### 3. Pre-expander, Pre-puff Storage, Molding, and Product Storage

##### Emissions Limits – (Permit Condition 3.3)

The combined VOC emissions from the pre-expander through the first 48 hours after molding shall not exceed 2,856 lb/day or 95.2 tons per any consecutive 12-month period.

[IDAPA 58.01.01.401.01, 4/5/00]

The daily VOC emissions limit was based on the potential to emit using the maximum process rate of 2,000 lb/hr and the maximum pentane concentration of 7% by weight. The previous permit limited the VOC emissions hourly, which would require hourly tracking to show compliance. Because the toxic pollutant screening level is a daily value and tracking pentane hourly is impractical, the modified permit limits VOC emissions on a daily basis.

The annual VOC emissions limit was set to ensure facility synthetic minor status.

#### **Compliance Demonstration**

The facility is required to track daily and annual EPS bead throughput rates and maintain documentation for each purchase of EPS beads. The documentation must show the percent pentane by weight. Because pentane is the only VOC, calculating the pentane emissions will determine the total VOC emissions. According to the Radian report, 85% of the total VOC present is emitted in the manufacturing process. The equation to determine VOC emissions is as follows:

$$\text{Daily VOC} = \text{Throughput (lb/day)} \times \% \text{ pentane} \times 0.85$$

$$\text{Annual VOC} = \text{Throughput (lb/yr)} \times \text{average \% pentane} \times 0.85 / 2000 \text{ lb/T}$$

#### **Throughput Limits – (Permit Condition 3.4)**

The maximum daily throughput of the pre-expander shall not exceed 48,000 lb/day. The maximum annual throughput of the pre-expander shall not exceed 3,200,000 lb/any consecutive 12-month period.

[IDAPA 58.01.01.401.01, 4/5/00]

The daily limit was set based on the maximum capacity of the equipment (2,000 lb/hr). The annual limit was set to ensure facility synthetic minor status.

#### **Compliance Demonstration**

The facility is required to monitor and record the throughput of EPS beads for each day and for the most recent 12-month period. The records can be compared to the permitted throughput limit to determine compliance.

#### **Pentane Limit – (Permit Condition 3.5)**

The permittee shall not expand EPS beads that contain pentane greater than 7% by weight.

[IDAPA 58.01.01.401.01, 4/5/00]

The pentane concentration in the EPS beads was limited to 7% to ensure compliance with the VOC daily and annual emissions limits.

#### **Compliance Demonstration**

The facility is required to monitor and record documentation for each purchase of EPS beads. The documentation must show the percent pentane by weight for the EPS beads. To show compliance, each of these records should indicate that the beads contain pentane by weight less than or equal to 7%.

#### 4. NSPS Applicability

Foam Molder's steam boiler is 6.3 MMBtu/hr, which is less than the 10 MMBtu/hr or lower applicability limit for steam-generating units per 40 CFR 60 Subpart Dc.

#### 5. NESHAPS Applicability

Because the EPS beads are used but not manufactured at Foam Molders, 40 CFR 63 Subpart JJJ does not apply.

#### 6. Compliance Issues

The facility performed a modification prior to obtaining the required PTC. The issue has been referred to the DEQ State Office.

#### 7. AIRS

**AIRS/AFS FACILITY-WIDE CLASSIFICATION DATA ENTRY FORM**

AIR PROGRAM	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	TITLE V	AREA CLASSIFICATION A – Attainment U – Unclassifiable N – Nonattainment
POLLUTANT							
SO <sub>2</sub>	B						U
NO <sub>x</sub>	B						U
CO	B						U
PM <sub>10</sub>	B						U
PT (Particulate)	B						
VOC	SM					SM	
THAP (Total HAPs)	B						
			APPLICABLE SUBPART				

**AIRS/AFS Classification Codes:**

- A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For NESHAP only, class "A" is applied to each pollutant that is below the 10 (T/yr threshold, but which contributes to a plant total in excess of 25 T/yr of all NESHAP pollutants.
- SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.
- B = Actual and potential emissions below all applicable major source thresholds.
- C = Class is unknown.
- ND = Major source thresholds are not defined (e.g., radionuclides).

#### **PERMIT FEES**

The project is for increasing allowable VOC emissions which triggers the requirements for a Permit to Construct. Therefore, a PTC processing fee applies in accordance with IDAPA 58.01.01.225. A fee assessment has been prepared for \$5000.00 as calculated in the appendix. DEQ received the processing fee on November 20, 2002.

## **RECOMMENDATIONS**

Based on the review of the application materials, and all applicable state and federal regulations, staff recommends that DEQ issue a modified Tier II Operating Permit and Permit to Construct to Foam Molders, Inc. An opportunity for public comment on the air quality aspects of the proposed operating permit was provided in accordance with IDAPA 58.01.01.404.01.c.

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cc:            Tom Harman, Coeur d'Alene Regional Office